

Schedule for Discrete Math – Fall 2012

Week of	Mtg #	Agenda For Class Meeting (What is Planned / What Happened)	Homework Assignment/Tasks (To be completed before the next class meeting)
AUG 15	[1]	Activity Getting a Little Discrete <i>overview of Discrete Math topics, background information</i>	Read Green Sheet
AUG 22	[2]	Activity Game of Sprouts <i>how to play, rules</i> Notes Graph Theory Basics: Vocabulary & Counting <i>vertex, edge, degree, strategies for counting</i>	Research Leonard Euler <i>write 3 sentences about Euler's life and why he is considered one of the greatest mathematicians</i>
	[3]	Activity Analyzing The Game of Sprouts <i>quantifiable differences, collecting data, looking for patterns, describing patterns</i>	Question How Many Moves? <i>Is it possible to predict the maximum number of moves that can be played in a Sprouts game based on how many vertices at the start of the game?</i>
	[4]	Activity The Euler Characteristic <i>quantifiable differences, looking for patterns</i> Notes Describing Structures in Graphs <i>adjacent, planar, complete</i>	
	[5]	Notes The "Essence" of a Graph <i>equivalent representations, isomorphisms, planar</i> Activity Water Puzzle <i>draw a graph that represents the game</i>	Research The Four-Color Problem <i>6 sentences (who, what, where, when, why, how)</i>
	[6]	Crossword Talking Graph Theory <i>facts about Euler, graph theory vocabulary</i> Activity Coloring Maps <i>Four Color Problem, algorithms</i>	Activity Coloring Maps <i>Four Color Problem, algorithms</i>
AUG 29	[7]	Activity Tracing a Graph Seven Bridges of Königsberg & Eulerian paths, <i>necessary & sufficient conditions</i>	Research The Traveling Salesman Problem <i>6 sentences (who, what, where, when, why, how)</i>
	[8]	Notes/Video Movement in Graphs: Paths & Circuits <i>path, circuit, necessary & sufficient conditions</i>	
	[9]	Notes Traveling Salesman Problem & Algorithms <i>Nearest Neighbor, Cheapest Link, strategies, establishing simple repeatable steps/clear process</i>	

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		LABOR DAY	
SEP 05	[10]	Activity Algorithms Everywhere <i>scrambling up messages</i>	Activity TSP in Florida <i>find a Hamiltonian circuit using both the Nearest Neighbor and Cheapest Link algorithms</i>
	[11]	Discuss Connectivity in Graphs <i>how to measure, bridges, cut vertices, pieces, applications</i>	Sample Quiz Questions Graph Theory Fundamentals [Solutions]
	[12]	Quiz Graph Theory Fundamentals Collect Homework & Classwork	Assignment Sudokus - A Glimmer of Algorithms
SEP 12	[13]	Discussion Navigating Sudoku Using Algorithms <i>practice the sudoku algorithm discussed in class</i> Video/Activity Getting There Efficiently <i>Dijkstra's Algorithm</i>	Assignment Finding the Shortest Path in Graphs [Numb3rs] <i>complete questions #1-4</i>
	[14]	Notes Examining Dijkstra's Byproduct <i>subgraphs, trees, digraphs, minimal spanning trees,</i>	Assignment Getting There The Fastest <i>apply Dijkstra's algorithm to find the shortest time to each intermediate point from Portland</i>
	[15]	Discuss Navigating Flow in Graphs [Numb3rs] <i>directed edges, source, sink, quantifying capacity, finding flow paths, determining max flow</i>	
	[16]	Notes Searching for Prime Numbers [Numb3rs] <i>definitions, exclusionary approach, Sieve of Eratosthenes</i>	
SEP 19	[17]	Notes Unpacking Familiar Algorithms <i>addition, multiplication, division, relevance of grouping in number systems</i>	Research Zero <i>6 sentences (who, what, where, when, why, how)</i>
	[18]	Discuss How & Why Zero Became a Number Video More Applications of Graphs & Algorithms <i>work flow, minimum spanning trees</i>	Assignment Turner Construction <i>find the least amount of time it will take to complete the construction project</i>
	[19]	Discuss Turner Construction <i>find the least amount of time it will take to complete the construction project</i>	Assignment Connecting the Campus
	[20]	Assignment Increasing Electricity Flow	Sample Quiz Questions More Graph Theory & Algorithms [Solutions]

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		FACULTY IN-SERVICE DAY	
SEP 26	[21]	Quiz <i>More Graph Theory & Algorithms</i> Collect Homework & Classwork	Research Perfect Numbers & Pentagonal Numbers
	[22]	Activity Creating an Dynamic Invoice Form <i>laptop cart etiquette, introduce & enroll to Moodle, basic features & operations of a spreadsheet</i>	
	[23]	Video The Magical & Spiritual Allure of Numbers <i>meanings for Pythagoreans, figurative, perfect, & amicable numbers, magic squares</i>	Research Patterns in Pentagonal Numbers
OCT 03	[24]	Activity Getting Grundy With It <i>number patterns, data collection, strategies</i>	Research A Big Prime Number <i>What was the largest known prime number on the day you were born?</i>
	[25]	Notes Setting the Stage for Number Theory <i>sequences, partitions, $p(n)$ function, connection to triangular numbers</i> Video Getting Primed for Number Theory <i>distribution of primes, $\pi(n)$ function, establishing bounds, natural log, comparing quantities</i>	Research Goldbach's Conjecture <i>Who? What? Where? When? Why? How?</i>
	[26]	Notes Partitioning: Primes, Clever, & Useful <i>divisibility, Goldbach's Conjecture, algorithm for substitution</i>	Research Euclid's Algorithm <i>Who? What? Where? When? Why? How?</i>
	[27]	Notes Euclid's Take on Partitions & Into the Mod <i>greatest common divisor, congruence, applications (ISBN numbers, check digits)</i>	
OCT 10	[28]	Spreadsheet Automating Algorithms <i>finding GCF/GCD via Euclidean, generating triangular numbers & sequences</i>	
		FROSH SERVICE DAY / PSAT / SENIOR WORKSHOPS	
		OCTOBER BREAK - Classes Do Not Meet	

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OCT 17	[29]	Activity Using Modular Arithmetic: Friday the 13th <i>modeling repeating cycles, finding congruences</i>	Assignment Predicting the Future <ul style="list-style-type: none"> • on a separate sheet, answer #1-9 • you must show work/steps
	[30]	Notes Going Backwards in Modular: Inverses <i>replacing subtraction with addition, replacing division with multiplication, conditions for multiplicative inverses</i>	Assignment Modular Arithmetic: Inverse Operations <ul style="list-style-type: none"> • on a separate sheet, solve #1-12 • you must show steps for all of your work
	[31]		
	[32]	Notes Finding Inverses via Fermat <i>replacing subtraction with addition</i>	Sample Quiz Questions Number Theory, Modular Arithmetic, & Spreadsheets
OCT 24	[33]	Discussion Saving Madeline from Markov <i>identifying strategies, counting, data collection & representation</i> Activity Developing a Saving Strategy from Data	Sample Quiz Questions Number Theory, Modular Arithmetic, & Spreadsheets
	[34]	Quiz <i>Number Theory Basics & Spreadsheets</i> Collect Homework & Classwork	Assignment Decoding a Secret Message <ul style="list-style-type: none"> • you must fully document all your attempts/work (even dead-ends) on a separate sheet
	[35]	Activity The Decoding Experience #1 <i>identifying strategies</i>	Read <i>Cryptography: Secret Writing</i> pp 11-15 <ul style="list-style-type: none"> • what are the "big ideas"
	[36]	Activity Making & Referencing Tables <i>laptop cart etiquette, lookup functions</i>	Read <i>Cryptography: Secret Writing</i> pp 16-28 <ul style="list-style-type: none"> • be able to discuss/explain at least 3 specific examples
OCT 31	OPEN HOUSE HOLIDAY		
	[37]	Crossword History of Secret Writing <i>big ideas, transposition vs. substitution, examples</i>	Read <i>Cryptography: Secret Writing</i> pp 29-56 <ul style="list-style-type: none"> • be able to discuss/explain at least 2 specific examples
	[38]	Video <i>Code-Breakers: Bletchley Park's Lost Heros Lorenz Machine (Tunny), number of settings & prime numbers, depth for breaking</i>	Read <i>Cryptography: Secret Writing</i> pp 57-85 <ul style="list-style-type: none"> • be able to discuss/explain at least 2 specific examples
	[39]	Reading Quiz <i>Cryptography: Secret Writing</i>	Read <i>Cryptography: Secret Writing</i> pp 86-90 <ul style="list-style-type: none"> • be able to discuss/explain the difference

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NOV 07	[40]	Notes Quantifying the Potential Substitutions <i>monoalphabetic vs. polyalphabetic, affine, developing algorithms for automation</i>	Read <i>Cryptological Mathematics</i> pp 27-34 <ul style="list-style-type: none"> • Monoalphabetic Substitution Ciphers
	[41]	Notes Mathematics of Substitution & Going Backwards <i>additive vs. multiplicative vs. affine, Fermat's Little Theorem, Euler's generalization, big number calculators</i>	Read <i>Cryptological Mathematics</i> pp 76-81 <ul style="list-style-type: none"> • Polyalphabetic Substitution Ciphers
	[42]	Spreadsheet Automating Substitution Ciphers <i>text referencing functions</i>	Read <i>Cryptological Mathematics</i> pp 103-108 <ul style="list-style-type: none"> • Polygraphic Substitution Ciphers
	[43]	Notes Mixing It Up Along the Way: Polygraphic Ciphers <i>changing key example, matrix algebra, Hill Ciphers</i>	Sample Quiz Questions Cipher & Code Systems
NOV 14	[44]	Cipher System Project - Introduction & Information <i>scope, expectations, guidelines, specifications</i>	
	[45]	Quiz Cryptography: Secret Writing Collect Classwork/Homework	Cipher System Project
	[46]	Cipher System Project - Computer Lab Workday <i>editing & adding pages/content to wikis, organize team homepage, generate ideas for substitution & transposition</i>	Cipher System Project
	[47]	Cipher System Project - Computer Lab Workday <i>create a calendar/timeline, identify & establish target dates, assign responsibilities</i>	Cipher System Project
NOV 21	[48]	Cipher System Project - Computer Lab Workday <i>spreadsheet layout & enciphering model</i>	Cipher System Project
		THANKSGIVING HOLIDAY	

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NOV 28	[49]	Cipher System Project - Computer Lab Workday <i>enciphering spreadsheet functionality, drafts of PowerPoint presentation & spec sheet</i>	Cipher System Project
	[50]	Notes - Understanding Public Key Encryption: RSA <i>modular arithmetic, primes, finding inverses, public and private keys</i>	Cipher System Project
	[51]	Cipher System Project Computer Lab Workday <i>deciphering spreadsheet functionality,</i>	Sample Quiz Questions <i>Cryptography: Codes & Ciphers</i>
	[52]	Quiz <i>Cryptography: Codes & Ciphers</i> Collect Classwork/Homework	Cipher System Project
DEC 05	[53]	Cipher System Project Computer Lab Workday	Cipher System Project
	[54]	Activity A Different Type of Secret: Steganography <i>video explanation, examples, generating patterns with random numbers via algorithms</i>	
	[55]	Presentations Cipher System Project Notes Overview of Game Theory <i>quantifying strategies, zero-sum, minimax theorem, Nash Equilibrium</i>	
	[56]	Presentations Cipher System Project Video - Pi [00:00 - 19:25] <i>analysis of main characters, plotline basics, Fibonacci Numbers</i>	
DEC 12	[57]	Movie Pi [19:25 - 42:54] <i>numerology vs. mathematics</i>	
	[58]	Movie Pi [42:54 - 71:00] <i>Golden Spiral & Rectangles from Fibonacci Numbers</i>	Sample Final Exam
	[59]	Movie Pi [71:00 - 85:00] <i>connections between Sol, Marcy, Max, and Lenny</i> Semester Reflection	
		SEMESTER EXAMS – LANGUAGE & SCIENCE	